

# The Institute of Geophysics and Planetary Physics (IGPP) at Los Alamos FY04 Call for Collaborative Research Proposals (Both New and Renewal Proposals)

Deadline for receipt: March 14, 2003

## INTRODUCTION

The Institute of Geophysics and Planetary Physics (IGPP) at Los Alamos is a branch of the University of California's Systemwide Institute of Geophysics and Planetary Physics. Its mission is to promote and coordinate basic research on the understanding of the origin, structure, and evolution of the Earth, the Solar System, and the Universe, and to develop the science base to predict future changes as they affect human life.

As part of the mission, IGPP at Los Alamos is committed to promoting and supporting high quality, cutting edge science in the areas of astrophysics, space science, solid planetary geoscience, and complex dynamical systems (including multi-compartment geophysical fluid dynamics, climate change, environmental hydrology, etc.). These focus areas are selected based on their breadth of scientific challenges facing the international scientific community at-large as well as on the strategic needs of extending scientific excellence at Los Alamos National Laboratory. IGPP/LANL makes a special effort to promote and support new research ideas, which could develop through seed funding into major programs supported by federal or other sponsor funding. Collaboration between LANL and University scientists is viewed by IGPP as the most efficient arrangement to promote creativity and extend science beyond today's understanding.

The Regents of the University of California and the Director of the Los Alamos National Laboratory provides funds for collaborative research projects involving LANL and University principal investigators (PI's), i.e., in the form of a minigrant program. In addition to UC proposals supported by this program, the IGPP at Los Alamos accepts proposals for collaborative research between the staff at Los Alamos and faculty, postdocs and students from non-UC institutions. Graduate student and/or postdoc participation is an essential component of all approved minigrant projects. Successful non-UC proposals are funded entirely by Los Alamos and the university PI's home institution. Non-UC collaborators are therefore **required** to include some form of analogous support from their institutions. On average, roughly 60% of all approved IGPP minigrants originate from non-UC campuses (including non-US campuses).

Minigrants issued by IGPP are for one year duration, but may be renewed for up to three years (if necessary). In most cases, minigrants are dedicated to support travel costs for participating PI's, some equipment costs, and salary and travel expenses for graduate students and/or postdocs. Limited salary is provided, on a case by case basis, to University and Laboratory PI's. Typical grants are of order \$20K-\$40K, per annum, and roughly 40-50 grants are issued each year, roughly half of which are renewals.

This call is for collaborative research proposals in support of the topics specified below. Support for proposals is open to both the University of California and to other universities.

## Research Focuses and Topics

IGPP has a long-term commitment to basic research focused on the following research focus areas:

- Astrophysics (Richard Epstein, LANL)
- Space Physics (Joachim Birn, LANL)

- Solid Planetary Geoscience (Carl Gable, LANL)
- Complex Dynamical Systems (Gary Geernaert, LANL)

Each of these focus areas is directed by a focus leader (identified in parentheses) who is responsible for coordinating research efforts so that individual projects will benefit from cross-communication. Potential investigators should call IGPP to contact the appropriate focus leader and/or visit the IGPP web site (<http://www.igpp.lanl.gov/>). A description of the four focus areas follows:

The **Astrophysics** Focus fosters theoretical, observational, and instrumentation research. Of particular interest are multidisciplinary projects at the boundaries between astrophysics and nuclear physics, particle physics, condensed matter physics, plasma physics, and/or general relativity. Recent research supported under this focus includes projects in gamma ray astrophysics, space instrumentation, stellar dynamics, neutron star physics, cosmic rays, solar neutrinos, primordial black holes, intergalactic magnetic fields, active galactic nuclei, and the cosmic microwave background. Besides these topics, we are interested in supporting research on supernovae, the energetics of supermassive black holes, physics of accretion disks, dynamics of radio pulsars, and the dynamics of the interactions between superfluids and normal matter. Use of LANL facilities is highly desirable, e.g., exploitation of the Milagro gamma-ray observatory.

The **Space Physics** Focus supports theoretical, computational, and observational research into the plasma environment of the Earth and into processes that affect this environment, and research on the transport of plasma and energy from the sun through interplanetary space to the Earth. These include the interaction of various plasma populations and the coupling of microscopic and macroscopic phenomena. Particular emphasis is placed on advancing our understanding of the processes that influence “space weather,” which refers to conditions on the sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems. In addition, IGPP is particularly interested in furthering our understanding of magnetospheric substorms, magnetotail current sheet dynamics, and dusty plasmas. Leveraging against LANL facilities and data bases, e.g., linkage to multi-cluster satellite experiments or computer simulation codes, is strongly encouraged.

The **Solid Planetary Geoscience** Focus supports a breadth of basic research extending from the lithosphere to planetary interiors, including numerical, seismic, paleomagnetic, and laboratory studies of the geophysical and geochemical structure, properties, processes, and fluid dynamics of terrestrial and giant planets. Major emphasis is on mantle and core dynamics, numerical convective models, seismic and/or electrical tomography, thermal fields, magnetic field generation, and variation as seen in geodynamo models and magnetic observations. In addition, studies of magma chamber processes, fluid flow in porous and fractured media, elasticity of material under high pressure, and rock-water interactions and their monitoring with suitable tracers, are all encouraged. Basic research which can be mapped to ongoing programmatic work or in support of new programmatic initiatives is encouraged. It is strongly recommended that proposals are able to exploit unique Los Alamos resources if appropriate, e.g., use the Los Alamos Neutron Scattering (LANSCE) facility or other experimental facilities in divisions conducting research in the earth sciences, materials, and/or remote sensing.

The **Complex Dynamical Systems** Focus emphasizes the nonlinear dynamics and multi equilibria of the coupled atmosphere, (liquid and ice covered) ocean, hydrosphere, and biosphere of planet Earth. Of special interest are studies which extend our understanding of the causes of temporal variations of ocean basin scale oscillations, rapid climate change caused by abrupt changes

in oceanic circulation or atmospheric dynamics, the influence of variable solar forcing, and the interactions between regional and global scale ecohydrology (including, e.g., soil-bacteria-plant-atmosphere interactions on daily through decade-long time scales). It is encouraged, though not required, that basic science proposals are able to exploit traditional and non-traditional climate, ecosystem, and other related LANL data bases, programs, and expertise, e.g., nonlinear dynamics, complex dynamical systems theory and uncertainty analysis, ecosystem experimental facilities, data from the ARM program, and the LANL modeling activities as part of the Community Climate Modeling System (linked to LLNL and NCAR) and other consortia.

### **Relevance to Laboratory Efforts**

In keeping with new programmatic directions at Los Alamos, IGPP will be particularly interested in basic research proposals that support:

- climate, air pollution, and environmental studies;
- high-performance computing;
- environmental nonstationary microbiology;
- material properties;
- migration of fluids in geologic media for water resources and contaminant migration;
- eco-hydro-biological stress, meteorology, and homeland security;
- nonlinear dynamics, complex systems theory, and uncertainty analysis;
- remote sensing;
- solid Earth studies for nonproliferation, earthquake and volcanic hazards.

While proposals do not have to be for specific work in these areas, those whose results will provide basic capabilities for these areas will be given special consideration. In addition, proposals that will make use of LANL facilities will be favorably treated.

### **FUNDING AND IN-KIND CONTRIBUTIONS**

The funding interval is October 1, 2003, through September 30, 2003; however, this is contingent upon the date the contract is awarded by the LANL Contracts Office.

Student and/or postdoc participation is one of the general criteria used in critiquing submitted proposals. To this end, UC waives overhead on student salaries in this program. Non-UC institutions are encouraged to do the same, and, if this is impossible, some alternative contribution in kind is expected.

In many cases, proposals may be submitted as multi-year efforts. Renewals for the second or third year are determined based on progress during the previous year and progress reports delivered on time.

### **REPORTING REQUIREMENTS AND SCHEDULE**

Progress reports summarizing the results of the previous year's work will be required upon completion of the year (**due by the first week in October**). In addition, a progress report must accompany proposal renewals, to be delivered by close of business March 14, 2003. Renewal proposals will not be funded without submission of the progress report. A final report summarizing all findings and results of the project will be required upon completion of the project. We would appreciate the PI's help in notifying IGPP of all publications citing IGPP support, even if these publications appear after the expiration of the award.

## SPECIAL LARGE PROJECT COMPETITION

In addition to the above projects, IGPP is soliciting proposals for a single project for up to \$100K for particularly innovative research. Examples of such needs are: concentration of effort on a specific topic that needs rapid advance, multi-campus/laboratory project, important project requiring salary for Laboratory PI, project requiring specific funds such as laboratory apparatus, field trips, etc. The intent is for IGPP to support a single project whose results would be of considerable interest to the community at large and to the Laboratory, and that could only be completed with increased funding. The project would be supported for up to three years (assuming adequate yearly progress and available IGPP funding). Interested investigators should contact the IGPP Director directly for additional information and assistance. Please note that the IGPP at Los Alamos will fund salaries of faculty or campus professional researchers for work at Los Alamos but normally not for work at their respective home institutions. Laboratory PIs on the other hand may be subsidized.

## ELIGIBILITY

Any member of the academic personnel of a UC campus or of a non-UC university who is eligible to serve as a principal investigator for research performed under the auspices of that university is eligible to submit a research proposal as “university co-principal investigator.” (UNIVERSITY PI)

Any full-time member of the technical staff of Los Alamos National Laboratory is eligible to submit a research proposal as a “laboratory co-principal investigator.” (LABORATORY PI)

## SELECTION CRITERIA

### General Criteria for new proposals

1. Long term **goal and the specific project objectives** are clearly defined.
2. The **interdisciplinary nature** of the proposal and the **relevant IGPP focus area** should be clearly identified. Proposals which are relevant to several focus areas are also encouraged; in this case, several focus areas may be identified.
3. The **background** material provides a clear summary of the scientific debate, e.g., weakness of existing paradigms which must be resolved, and how the proposed work will “make a difference” via hypothesis testing.
4. The **approach and expected deliverables** can be mapped to the project objectives.
5. **Timeliness.** The UNIVERSITY and LABORATORY PI’S should, if at all possible, explain why the proposed work should be funded now, and not next year.
6. **Creativity and/or innovation** are apparent. The proposed work is not only good science, but there is something new in the proposed work which will add a new dimension to the scientific discipline.
7. **Research facilities at Los Alamos National Laboratory** are, where possible and practical, to be exploited in the proposed work.
8. **Work plan.** Documentation of the roles of the University and Laboratory PI’s, as well as the graduate student and/or postdoc, in carrying out the research, is to be documented.
9. **Quality of both University and Laboratory PI’s** is high and can be documented in terms of scientific success rates.
10. **Quality of postdoc or graduate student.** A postdoc or graduate student must be included in the project. The students or postdocs assigned to the project must show promise to potentially become excellent future scientists.
11. **Mentoring.** In addition to the University PI, the Laboratory PI must demonstrate a commitment to mentoring of the postdoc or graduate student.

12. **Postdoc or graduate student at LANL.** It is expected that the postdoc or graduate student spends a significant fraction of time (e.g., order of a month or two each year, or more) working at LANL, with the Laboratory PI.
13. **Exchange of seminars and visits.** PI's plan to spend some time at other's research institute, and seminars are exchanged.
14. **LANL relevance and broader perspective.** The proposed science is related to one or more of the four focus areas, and there is an anticipated link to broader programmatic areas of LANL, DOE, or other laboratories/agencies.
15. **Declaration of ongoing projects and uniqueness of funding request.** PI's must declare that the proposed work is not duplicating work already funded from other sources. The proposed work may, however, leverage against related work funded by other sources as a means to exploit facilities, data bases, or other collaborations. All projects funded by other agencies must be reported.
16. **Budget.** The budget request provides detailed information on salary, equipment, and travel requests for both the University and LANL components.

#### Criteria for renewal proposals

In addition to the 16 criteria outlined above, renewal proposals must include:

17. **Progress report.** A progress report in *Physics Today* level format, of order 3-5 pages, is submitted, which contains:
  - Project objectives and brief summary of work plan (maximum half page)
  - Summary of research results to-date (1-3 pages), plus any relevant graphics
  - Any new insights or challenges in meeting project objectives
  - Any complications in meeting project objectives
  - List of publications, including submissions
  - Presentations
  - Name of grad student and/or postdoc
  - Progress towards PhD, if graduate student
  - Documentation of visits to LANL and/or to University
  - LANL and/or facilities used in the research
  - Budget details

#### Special for renewal proposals

For renewal proposals, the PI's have the option of attaching the original proposal to the progress report, if and only if there are no changes in the project's goals and work plan.

## **REVIEW PROCESS**

All initial proposals undergo peer review by relevant scientists in the broad research community. Renewal proposals may or may not be subject to external peer review at the discretion of the appropriate focus leader or the Director of IGPP at Los Alamos. All proposals then undergo a final review by IGPP and its External Advisory Committee, during its next meeting in May 2003, during which the earlier peer reviews are taken into account. Final decisions on acceptance/denial and funding to individual proposals will be reached in June 2003.

Most proposals which have received low scores in recent years have been attributed to one or more of the following:

- Objectives and background which are unclear or inadequately argued.
- Methods, which are inadequately described, or do not reflect state-of-the-art.
- Approach, which is not convincing enough to satisfy the objectives.
- Collaboration between Laboratory PI and University PI is not obvious.
- Important and relevant LANL facilities are not considered or exploited.
- No graduate student or postdoc involved in the research.
- Lack of commitment by the Laboratory PI to the research or mentoring process.

- Subject matter is not relevant to LANL scientific interests or research directions.

## SECURITY CONSIDERATIONS

Classified work is not supported under the IGPP minigrant program. Therefore, all research facilities (including office space and computing) conducted under IGPP funding will be carried out in unclassified space.

## MAILING INSTRUCTIONS AND DEADLINE

Proposals (title, abstract page, main body including budget) may be submitted by email or by regular post, to be received by IGPP no later than March 14, 2003. Signature pages (with original signatures) must be received by close of business March 28, 2003. A confirmation of receipt of the proposal at IGPP will be sent by email to the University and Laboratory PI's. We are encouraging electronic submittal.

Submission by email, with copies to: Gerald Geernaert <[geernaert@lanl.gov](mailto:geernaert@lanl.gov)>  
Rebecca Johnson [rebecca\\_j@lanl.gov](mailto:rebecca_j@lanl.gov)

If not submitting electronically, send five copies by post:

Center Director  
IGPP, Mail Stop C305  
Los Alamos National Laboratory  
Los Alamos, New Mexico 87545

*For Federal Express shipments, use:*

Center Director  
IGPP, MS C305  
Warehouse SM 30, Bikini Atoll Rd.  
Los Alamos National Laboratory  
Los Alamos, New Mexico 87545

Only for proposals involving the University of California, send an information copy to:

Professor Jean-Bernard Minster  
Systemwide Director, IGPP  
Scripps Institution of Oceanography/UCSD  
IGPP MC A025  
9500 Gilman Drive  
La Jolla, California 92093

**NOTE: The March 14, 2003, deadline for receipt of proposals, by email or post, is firm. Signature pages must be received by post, no later than March 28, 2003.**

## FURTHER INFORMATION:

Gerald Geernaert, Director  
[geernaert@lanl.gov](mailto:geernaert@lanl.gov)  
1-505-667-6020

Rebecca Johnson  
[rebecca\\_j@lanl.gov](mailto:rebecca_j@lanl.gov)  
1-505-667-7436

## PROPOSAL CONTENTS CHECKLIST

### 1. Cover and Signature Sheets (use format provided)

For convenience in gathering the required signatures, separate “Cover and Signature Sheets” are provided for the University and Laboratory PIs. Proposals will not be accepted until all required original signatures have been received. Name, title, address, and phone number must also be included under all signatures. Proposing University PIs must receive approvals from Department Chair or Director of campus-organized research unit, Management Service Officer or Fiscal/Budget Person, and Contract and Grants Officer. Proposing Laboratory PIs must receive approvals from Group and Division Leaders.

### 2. Title and Abstract Sheet

Give project title, principle investigators, and abstract. The Abstract should include a brief statement explaining the objective of the proposed research, the method of approach, and how the “Specific” and “General Criteria” are met.

### 3. Main Body (including budget information)

Use the following outline in formatting the main body; please limit to five total pages of text (for Sections I through IX), plus budget page:

#### TITLE

- I. Principal investigators and team, including all contact information
  - i. University PI: address, email
  - ii. LANL PI: Group, email
  - iii. Name of participating postdoc or graduate student, if known
- II. Start date, and project duration
- III. Objectives
- IV. Background
  - a. History of problem
  - b. Scientific debate
  - c. Hypotheses to test
  - d. Why now?
- V. Approach
  - a. Theoretical, numerical, or experimental activity
  - b. Methods used (describe comprehensively)
  - c. Any relevant leveraging or necessary coordination, e.g., other projects or facilities
- VI. Resources used in the project
  - a. Resources at Los Alamos
  - b. Resources at the University
  - c. Other Resources
- VII. Statement of Work
  - a. Tasks to be performed
  - b. Milestones
  - c. Deliverables
- VIII. Proposing Team

- a. Role of University PI
  - b. Role of Laboratory PI
  - c. Role of postdoc or graduate student
    - i. Identify if MSc or PhD project, if grad student
  - d. Other participants
- IX. Significance
  - a. What is the significance of the project? One way of getting at this is to answer the question, “When this project is finished and published, who will use the results?” This question should be dealt with explicitly, with significant input from the Laboratory PI.
- X. Budget summary
 

Indicate separately those amounts to be spent on campus(es) and at Los Alamos.
- XI. Supplemental budget information (including a section on current and pending support for research from other sources)
 

Provide additional detail on the following budget items:

  - i. Salaries (include names, titles)
  - ii. Supplies
  - iii. Travel
  - iv. Equipment
  - v. Other budget items.
- XII. References
  - a. *Journal of Geophysical Research* style is preferred.
- XIII. Biographical sketches of PI's (Provide information on already identified graduate students as well as on PI's, ~1 page each).
- XIV. Progress report for renewal proposals
  - a. Research Progress During Reporting Period:
    - i. The section entitled “Research Progress During Reporting Period” should be 3-5 pages, including discussion of progress by participating students, *e.g.*, progress in dissertation research.
  - b. Papers published
    - i. Refereed Journal Articles Published,
    - ii. Refereed Journal Articles in Press or Submitted,
    - iii. Refereed Journal Articles in Preparation,
    - iv. Other Articles Published,
    - v. Other Articles in Press or Submitted
    - vi. Other Articles in Preparation, and
    - vii. Technical Presentations.
  - c. Funding:
    - i. In the section on funding, briefly summarize the history of IGPP funding for the project, steps taken during reporting period to obtain sponsorship from sources other than IGPP at Los Alamos, and progress made.



**REQUIRED FORMAT**

**COVER AND ORIGINAL SIGNATURE SHEET  
FOR UNIVERSITY PI**

**RESEARCH PROPOSAL TO  
THE INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS  
LOS ALAMOS NATIONAL LABORATORY**

**Title of Proposal:** \_\_\_\_\_

New \_\_\_\_ Renewal \_\_\_\_ (IGPP Award # \_\_\_\_\_)

**Campus Principal Investigator(s):**  
*(include address, phone, fax, and e-mail address)*

**Signatures**

\_\_\_\_\_  
\_\_\_\_\_  
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**Department Chairperson:**

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**Student(s):**

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**Contracts and Grants Officer:**

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\_\_\_\_\_

**Research Area:**

\_\_\_\_ Astrophysics  
\_\_\_\_ Space Physics  
\_\_\_\_ Solid planetary geoscience  
\_\_\_\_ Complex dynamical systems  
\_\_\_\_ Other (please specify)

**Management Service Officer or  
Fiscal/Budget Person:**

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\_\_\_\_\_  
\_\_\_\_\_

**Date of Submission:** \_\_\_\_\_

**Total Amount Requested (Campus + Laboratory):** \_\_\_\_\_

**REQUIRED FORMAT**

**COVER AND ORIGINAL SIGNATURE SHEET  
FOR LABORATORY PI**

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**RESEARCH PROPOSAL TO  
THE INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS  
LOS ALAMOS NATIONAL LABORATORY**

**Title of Proposal:** \_\_\_\_\_

New \_\_\_\_\_ Renewal \_\_\_\_\_ (IGPP Award # \_\_\_\_\_)

Laboratory PI(s):

*(include address, phone, fax, and e-mail address)*

_____	_____
_____	_____
_____	_____
_____	_____

Group Leader:

Division Leader:

_____	_____
_____	_____

Student(s):

_____	_____
_____	_____
_____	_____

Research Area:

- \_\_\_\_\_ Astrophysics  
\_\_\_\_\_ Space physics  
\_\_\_\_\_ Solid planetary geoscience  
\_\_\_\_\_ Complex dynamical systems  
\_\_\_\_\_ Planetary Interiors  
\_\_\_\_\_ Other (please specify)

\_\_\_\_\_  
\_\_\_\_\_

Date of Submission: \_\_\_\_\_

Total Amount Requested (Campus + Laboratory): \_\_\_\_\_

**REQUIRED FORMAT**

**BUDGET SUMMARY**

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	<u>Campus</u>	<u>Los Alamos</u>
1. Salaries and Fringe Benefits	_____	_____
2. Burden (campuses, none)	_____	_____
3. Supplies	_____	_____
4. Computer Usage	_____	_____
5. Travel	_____	_____
6. Equipment	_____	_____
7. Other	_____	_____
TOTALS	_____	_____

Total Requested for Campus + Laboratory = \$ \_\_\_\_\_